

**Published:**

- *With international search report.*
- *Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

SYSTEM AND METHOD FOR SENDING HOLD MESSAGES TO CALLERS TO A WIRELESS COMMUNICATION DEVICE

FIELD OF THE INVENTION

5 The present invention is related generally to wireless communication devices, and more particularly, to a system and method for sending hold messages to individuals calling the user of the wireless communication device.

BACKGROUND OF THE INVENTION

10 Modern wireless communication devices, such as cellular telephones, are very popular for business and recreational uses. They allow a user of the phone to be reached at many locations where a conventional phone is not readily accessible. For example, the user can be reached by a caller when the user is
15 driving or attending a social function. However, there are many inconvenient instances when the cellular telephone rings, and the user has to move to a more appropriate location to speak to the caller. Examples of inconvenient instances include when the user is watching a movie in a theater or attending a business meeting. It is highly disruptive in these instances for the user to answer the
20 incoming call and to speak to the caller. Frequently when this happens, the user usually answers the incoming call and whispers to the caller to wait while the user moves to a more convenient location to speak. Sometimes, telephone calls are missed because, instead of answering the call once the phone rings, the user tries to find a more appropriate location while the phone repeatedly rings, and
25 the user does not get to the new location before the call is terminated.

 Accordingly, there exists a need to be able to indicate to callers that the user cannot answer the incoming call at the moment, and then to give the user time to receive the call in an appropriate location. The present invention provides these and other solutions as will be apparent from the following
30 detailed description and accompanying figures.

SUMMARY OF THE INVENTION

The present invention is embodied in a system and method directed to sending a prerecorded message to a caller calling a user of a wireless communication device, and placing the incoming call on hold until the user
5 answers the incoming telephone call. In an exemplary embodiment, the wireless communication device allows the user to prerecord one or more messages and store these messages in a memory. If an incoming call is received and the user cannot answer the call at that moment, the user can press a button on a keypad of the wireless communication device to select and transmit the
10 prerecorded message to the caller and to place the incoming call on hold.

In an exemplary embodiment, the incoming call is placed on hold by a call processor. A first instruction from the user directs the call processor to retrieve the selected prerecorded message from the memory and transmit the prerecorded message to the caller. After the prerecorded message is
15 transmitted to a caller, the call is placed on hold by the call processor until the user answers the call. A second instruction from the user takes the incoming call off hold, for example, by pressing a button on a keypad of the wireless communication device or through some other conventional means.

While the prerecorded message is being transmitted to the caller, an
20 exemplary embodiment of the invention includes visual displays on the wireless communication device to provide an indication to the user that the prerecorded message is being transmitted and that the caller is on hold. The visual display can also indicate which of the prerecorded messages was transmitted to the caller. In addition, after hearing the prerecorded message,
25 the caller hears feedback transmitted by the wireless communication device to indicate that the call is on hold and is still connected.

Numerous other options are available to both the user and the caller. For example, the user can direct the incoming call to a voicemail system. Or alternatively, after hearing the prerecorded message, the caller can have the
30 option of having the incoming call directed to the voicemail system.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a functional block diagram of an exemplary embodiment of the wireless communication system of the present invention; and

FIG. 2 is a flow chart illustrating how an incoming call is
5 processed by the embodiment shown in FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is incorporated in a wireless communication device, such as a cellular telephone, and functions to place the caller on hold
10 while the user tries to find an appropriate location to answer to call. The system is automated so that the user can simply press a button to send a prerecorded hold message to the caller and then to place the incoming call on hold, rather than having to answer the incoming call and quietly telling the caller to hold. Further, the system provides the user and the caller with several options, such
15 as sending the incoming call directly to voicemail, or sending a prerecorded instruction to the caller to call back at a later time.

The present invention is embodied in a system 100 illustrated in the functional block diagram of FIG. 1. The system 100 is incorporated into a wireless communication device 101, which may be embodied in a cellular
20 telephone. The system 100 includes a housing 102 that contains a transmitter 104 and a receiver 106 to allow transmission and reception of data, such as audio communications, between the system 100 and a remote location, such as a cell site controller (not shown). The transmitter 104 and the receiver 106 may be combined into a transceiver 108. An antenna 110 is attached to the housing 102
25 and is electrically coupled to the transceiver 108. The operation of the transmitter 104, receiver 106, and antenna 110 is well known in the art and need not be described herein. Although described herein as a cellular telephone, the principles of the present invention are applicable to a variety of wireless communication devices including, but not limited to, cellular/PCS, radio
30 telephone, conventional radio, and the like. Accordingly, the present invention is not limited by the specific form of wireless communication device.

The wireless communication device 101 also includes a central processing unit (CPU) 112, which controls operation of the system 100. The CPU 112 may perform all the tasks involved in the operation of the system 100, or only a portion of them, where the remaining tasks are delegated to other processing units included in the system 100. For example, the wireless communication device 101 includes, in addition to the CPU 112, a call processor 114 that controls the routing of incoming telephone calls and prerecorded messages. The call processor 114 can be located in the system 100 or it can be at a remote external location, such as a cell site (not shown). The call processor 114 can be a combination of hardware and software. The specific functions of call processor 114 will be described in greater detail below.

The wireless communication device 101 further includes a memory 116 which may include both read-only memory (ROM) and random access memory (RAM). A portion of the memory 116 may also include non-volatile random access memory to store information that must be present upon powering the wireless communication device 101. The memory 116 is generally used to store instructions and data for processing by the CPU 112, including addresses for retrieving stored messages within a message storage 132. The message storage 132 is another memory within the wireless communication device 101 that stores prerecorded messages or voicemail messages. Although the message storage 132 is shown in FIG. 1 as being separate from the memory 116, it is to be appreciated that one skilled in the art can make the message storage 132 part of the memory 116. That is, the memory 116 could be divided into addressable areas where the prerecorded messages may be stored and accessed by the CPU 112, or by any other processing unit, such as the call processor 114.

The wireless communication device 101 also includes an audio input device, such as a microphone 120 and an audio output device, such as a speaker 122. The microphone 120 and the speaker 122 operate in a conventional manner to provide two-way audio communication using the wireless communication device 101. The microphone 120 is also used as an input by the user to prerecord a message for storage in the message storage 134. The speaker 122 is driven by driving signals generated by an output driver 124. The driving

signals provided by the output driver 124 are converted by the speaker 122 into audible signals to transmit the voice of the caller to the user or to produce audible cues that inform the user when an incoming call is being received. An alert circuit 130 can act in conjunction with the output driver 124 to create the
5 audible cues. Examples of alerts that can be created by the alert circuit 130 include a ringer that alerts the user of an incoming call, a key beep to indicate when a key on the wireless communication device is depressed, and a message alert to signal the user of an incoming voicemail. Other possible alerts include a vibrator signal, which is an alternative to an audible cue. Instead of a ringer
10 informing the user of an incoming call, the wireless communication device 101 provides a vibrating alert.

The wireless communication device 101 also includes a display 126 to conveniently display user instructions as well as user-entered data, such as destination telephone numbers and alphanumeric text. As will be described in
15 more detail below, the display 126 can also inform the user when a prerecorded message is being transmitted to the caller and if the caller is on hold. Various other display outputs, such as a visual indicator that a voicemail has been left by the caller, are possible.

A keypad 128 is attached to the housing 102 for operation by the user in a
20 conventional manner. The keypad 128 provides a convenient input device by which destination telephone numbers and commands may be entered by the user. In an exemplary embodiment, the keypad 128 is used to select a prerecorded message from the message storage 104, transmit the prerecorded message to the caller, and place the incoming call on hold. Pressing a button on
25 the keypad 128, such as a SEND button (not shown), takes the incoming call off hold.

The various components of system 100 are coupled together by a bus system 132 of the wireless communication device 101, which may include a power bus, control bus, and status signal bus in addition to a data bus.
30 However, for the sake of clarity, the various buses are illustrated in FIG. 1 as the bus system 132.

The operation of the system 100 is illustrated in the flowchart of FIG. 2, which is to be read in conjunction with the block diagram of FIG. 1. In an exemplary embodiment of the invention, in step 200 the user first records one or more messages and saves the messages in the message storage 134. The message storage 134 can also store factory-recorded messages. To record a message, the user presses the appropriate keys on the keypad 128 to initiate the recording process. The user then speaks into microphone 120, and the message is recorded and stored in message storage 134. A person skilled in the art would know how to design the wireless communication device 101 to allow the recording and storing of messages.

Whenever the user wishes to playback a particular prerecorded message stored in the message storage 134 for review prior to a transmission, or to transmit a prerecorded message to a caller, as will be described in further detail below, the user can press the appropriate keys on the keypad 128, thereby instructing the call processor 114 to retrieve the appropriate message from the message storage 134. In one embodiment of the invention, each number on the keypad 128 corresponds to a precoded message or to a command option recognized by the call processor 114. Pressing a button on the keypad 128 sends a signal instructing the call processor 114 to execute a function, such as retrieving a message located at an address in the message storage 134. Use of the keypad 128 to retrieve a recorded message is known to those skilled in the art and need not be described in greater detail herein. Alternatively, the user may preselect one of the prerecorded messages (e.g., "I'm in a meeting, but will take your call in 30 seconds. Please hold.") and play the preselected message with a one-button operation.

After the prerecorded messages are stored in the message storage 134, the wireless communication device 101 is ready to receive incoming telephone calls. When an incoming telephone call is received, as shown in step 202 of FIG. 2, the user is usually alerted by a ringer. As mentioned above, the alert can also be in the form of a vibrator alert. In yet another alternative, the user can preset the wireless communication device 101 to automatically route incoming calls into voicemail, as shown at step 206, without the wireless communication

device 101 providing an alert. The wireless communication device 101 can further provide a visual indication on the display 126 to alert the user that there is a voicemail waiting to be heard.

Upon hearing the alert in step 202, the user can chose to answer the
5 telephone call in step 204 by pressing the SEND button on the keypad 128 of the wireless communication device 101 or through some other conventional method. If the user does not choose to immediately answer the incoming call, then step 208 gives the user two possible options. First, the user can send the call directly to voicemail in step 206. This is done by pressing a button on
10 keypad 128 that corresponds to a command to the call processor 114 to route the call to voicemail. Alternatively, the user can select in step 210 any of the prerecorded messages 212, 224, or 226 to transmit to the caller. For example, one of the prerecorded messages could state that the user is unable to take the call and would then request the caller to call back at a later time, shown in step
15 224. To transmit this message, the caller simply presses the appropriate key on the keypad 128 that corresponds to this message, and the call processor 114 would then retrieve this message from the message storage 134 and transmit the message to the caller. Alternatively, the call processor 114 can give the caller an option of leaving a voicemail, and would then wait for a response from the
20 caller to route the call to voicemail. A variety of other messages are possible, as illustrated in step 226.

Other prerecorded messages include asking the caller to hold for a period of time until the user can answer the call, shown in step 212. It is possible to program the system 100 to access and transmit several variations of
25 this message. For example, one prerecorded message could ask the caller to hold for ten seconds, while another prerecorded message would ask the caller to hold for 45 seconds. The appropriate message to transmit to the caller would be chosen by the user by pressing one or more keys on the keypad 128 that corresponds to the desired message. Also, the call processor 114 can be set to
30 keep the call on hold for only during the period specified in the message, and afterwards, the incoming call is completed to the user. In many situations,

however, the call processor 114 will keep the call on hold until instructed by the user to take it off hold.

In an option of the embodiment described above, steps 208, 210, and 212 can be simplified into a single step, with the user pressing only one button without having to step through a menu. That is, the user can prerecord a single message asking the caller to hold for 30 seconds, for example, and also set the hold time for an incoming call. When an incoming call is received, the user can simply press a single key to immediately transmit that particular prerecorded message and immediately place the caller on hold for the time specified. The user can continue to keep the incoming call on hold by repeatedly pressing the key. This simplified operation greatly minimizes inconvenience and annoyance to others near the user when the wireless communication device 101 receives an incoming call. The user can simply press the key after the first ring to silence the ringer and to place the call on hold, thereby eliminating the need to think of a response option while the wireless communication device 101 is continuously ringing.

While the prerecorded message is being transmitted to the caller, the display 126 can alert the user that the prerecorded message is being transmitted. This is shown in step 214 in FIG. 2.

After the prerecorded message is transmitted in step 212, the incoming call is placed on hold by the call processor 114 in step 215. Those skilled in the art will understand how to place a call on hold without additional details. While the call is on hold, it is possible to transmit feedback to the caller to indicate that the call is still connected and that the call is on hold, as shown in step 216. For instance, the feedback could be tone, music, or audio messages. Furthermore, while the call is on hold, there could be an alert on the display 126 to indicate to the user that there is a call on hold. This is shown in step 218 in FIG. 2.

In decision 220, while the caller is still on hold, and before the time period specified in the message in step 212 has elapsed, the caller can answer the call in step 204, after the user has found a suitable location to answer the call. Alternatively, while the caller is still on hold during the time period

specified in step 212, the user can chose to route the call in another fashion, shown as step 210. If the option of step 210 is chosen, then the user has the options of sending the call directly to voicemail in step 206, transmitting a new message asking the caller to call back at a later time in step 224, or transmitting
5 another message to the caller asking the caller to hold for another specified period of time in step 212. If the option of step 212 is chosen, the process repeats as described above.

If the call processor 114 has been set to take the call off hold after a specified time and the time specified in the prerecorded message elapses, then
10 the display 126 can alert the user that the allocated time has elapsed, as shown in step 221, or step 222. The call processor 114 then gives the user options on how to handle the call, including answering the call in step 204. Alternatively, the user can transmit another prerecorded message in step 210. As before, the user can then send the call directly into voicemail in step 206, ask the caller to
15 call back with a prerecorded message in step 224, or transmit another message to the caller asking the caller to hold for another period of time in step 212. If the option of step 212 is chosen, the process will repeat as previously described above.

To summarize, the system 100 allows the user to prerecord one or more
20 messages for transmission to a caller. When an incoming call is received by the wireless communication device 101, the user can route the incoming call directly to voicemail or transmit a prerecorded message to the caller asking the caller to hold or to call back. After the incoming call has been on hold for a period of time, the user can answer the call, continue to keep the call on hold, or
25 transfer the call to voicemail. The system 100 can be programmed so that the selection of a prerecorded message, transmission of the prerecorded message, and holding of the incoming call is accomplished by simply pressing a single key on the keypad 126 without having to step through a menu in the wireless communication device 101.

30 Although not shown in the figures, it is also possible for the caller to interact with the call processor 114. For example, if while the caller is on hold, the caller no longer wishes to be kept on hold and instead would like to leave a

voicemail, then one of the prerecorded messages could instruct the caller on how to do so. The prerecorded message could say something like, "Your call is still on hold. If you wish to remain on hold please stay on the line. If you wish to be transferred to voicemail, please press 1." The caller could then respond by pressing the "1" key on the caller's keypad, and the call processor 114 would receive this signal from the receiver 106. The call processor 114 would then route the call to voicemail. The specific details of how to transmit voicemail greetings, record and store voicemail messages, and retrieve the voicemail messages are not described in detail herein because caller-originated instructions are only marginally relevant to what is to be considered the present invention, and such details are well known to those skilled in the art.

From the foregoing it will be appreciated that, although specific embodiments of the invention have been described herein for purposes of illustration, various modifications may be made without deviating from the spirit and scope of the invention. For example, the call processor can be programmed to immediately transfer the incoming call to voicemail if the call is left on hold for greater than two minutes. This feature is convenient in situations where the user has forgotten that an incoming call has been placed on hold. Accordingly, the invention is not limited except as by the appended claims, the interpretation of which are to be made in accordance with established doctrines of claim interpretation.

What is claimed is:

CLAIMS

1. A wireless communication system having a transmitter and a receiver and receiving an incoming call from a caller, the system comprising:
an audio input device to allow the user to record a message for a transmission responsive to the incoming call;
a memory coupled to the audio input to receive and store the message;
and
a call processor communicatively coupled to the memory and responsive to a first instruction from the user to retrieve the message from the memory, the call processor controlling the transmitter to transmit the message to the caller after the incoming call is received, the call processor further placing the incoming call on hold in response to the first instruction.

2. The system of claim 1 wherein the message instructs the caller to hold, and the message includes a feedback transmitted to the caller by the wireless communication system to indicate to the caller that the incoming call is connected and is on hold.

3. The system of claim 1, further comprising a display to indicate to the user that the message is being transmitted to the caller and that the incoming call is on hold, the display making this indication in response to transmission of the message by the call processor.

4. The system of claim 1 wherein the memory stores a plurality of messages retrievable by the call processor, the system further comprising a display to display a label indicative of which of the plurality of messages is being transmitted to the caller.

5. The system of claim 4 wherein the call processor is responsive to a signal sent by the user, the signal instructing the call processor to transmit a subsequent message to the caller while the incoming call is on hold, the

4 subsequent message being one of the plurality of messages stored in the
memory.

6. The system of claim 1, further comprising an input device for
2 sending the first instruction from the user to the call processor.

7. The system of claim 6 wherein the input device is a keypad
2 responsive to user activation to transmit a second instruction to the call
processor, the call processor being responsive to the second instruction to take
4 the incoming call off hold.

8. The system of claim 1 wherein the message notifies the caller that
2 the incoming call is being routed to a voicemail system and the first instruction
directs the call processor to route the incoming call to the voicemail system.

9. The system of claim 1, further comprising an alert circuit in a form
2 of a ringer coupled to the receiver to notify the user when the incoming call is
received by the wireless communication system.

10. The system of claim 1, further comprising an alert circuit in a form
2 of a vibrator circuit coupled to the receiver to notify the user when the incoming
call is received by the wireless communication system.

11. A wireless communication device having a transmitter and a
2 receiver, the wireless communication device comprising:

a memory to store a message for a transmission responsive to the
4 incoming call;

a call processor communicatively coupled to the memory, the call
6 processor responsive to a first instruction to execute a first command to retrieve
the message from the memory, a second command to transmit the message to
8 the caller after the incoming call is received, and a third command to place the
incoming call on hold; and

10 an input device, responsive to user activation, to send the first
instruction to the call processor to execute the first, second, and third
12 commands.

12. The device of claim 11, further comprising an audio input device
2 coupled to the memory to allow the user to create the message.

13. The device of claim 11 wherein the message instructs the caller to
2 hold, and the message includes a feedback transmitted to the caller by the
wireless communication device to indicate to the caller that the incoming call is
4 connected and is on hold.

14. The device of claim 11, further comprising a display, the display
2 responsive to the call processor when the call processor executes the first,
second, or third commands, and displaying data to indicate that the incoming
4 call is on hold.

15. The device of claim 11 wherein the input device is a keypad
2 wherein a single activation of the keypad causes the first instruction to be sent
to the call processor.

16. The device of claim 11 wherein the input device is responsive to a
2 subsequent user activation to send a second instruction to the call processor to
execute a fourth command to take the incoming call off hold.

17. The device of claim 11 wherein the memory stores a plurality of
2 messages and the call processor is responsive to the first instruction to execute
the first and second commands for one of the plurality of messages.

18. The device of claim 11 wherein the call processor is responsive to
2 data transmitted by the caller and received by the receiver to route the incoming
call to a voicemail system.

19. The device of claim 11 wherein the message notifies the caller that
2 the incoming call is being directed to a voicemail system, and the third
command further directs the call processor to route the incoming call to the
4 voicemail system.

20. The device of claim 11 wherein the user is notified of the incoming
2 call by an alert circuit in the form of a ringer coupled to the wireless
communication device.

21. The device of claim 11 wherein the user is notified of the incoming
2 call by an alert circuit in the form of a vibrator circuit coupled to the wireless
communication device.

22. A method for processing an incoming call sent from a caller to a
2 user of a wireless communication device, comprising:
receiving a notification at the wireless communication device indicating
4 the presence of the incoming call;
selecting a message stored in a memory of the wireless communication
6 device;
establishing a wireless communication link between the wireless
8 communication device and a communication device of the caller;
transmitting the selected message to the caller over the wireless
10 communication link; and
placing the incoming call on hold.

23. The method of claim 22, further comprising answering the
2 incoming call to take the incoming call off hold.

24. The method of claim 23 wherein answering the incoming call
2 comprises directing the incoming call to a voicemail system or repeating the
transmitting the selected message, and placing the incoming call on hold.

25. The method of claim 22, further comprising sensing user
2 activation of an input device, the establishing the wireless communication link,
transmitting the selected message, and placing the incoming call on hold being
4 performed in response to the user activation of the keypad.

26. The method of claim 22, further comprising displaying a visual
2 signal on a display of the wireless communication device to indicate that the
message is being transmitted and that the incoming call is on hold.

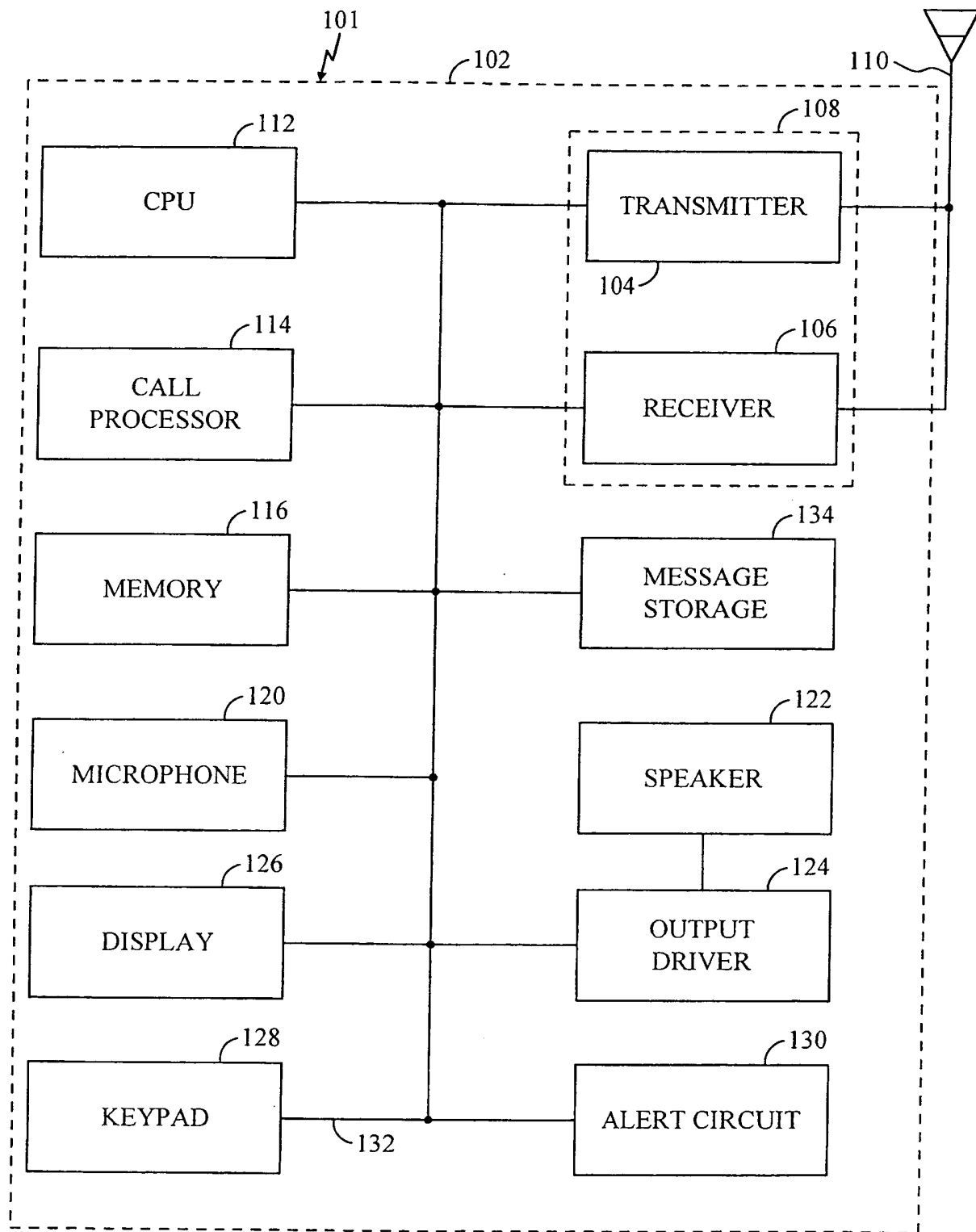
27. The method of claim 22 wherein placing the incoming call on hold
2 further comprises providing feedback to the caller to indicate to the caller that
the incoming call is still connected and is on hold.

28. The method of claim 22, further comprising repeating the
2 transmitting the selected message and placing the incoming call on hold to
continue to keep the incoming call on hold.

29. The method of claim 22 wherein the selected message has a
2 notification to the caller that the incoming call will be directed to a voicemail
system, and wherein placing the incoming call on hold includes directing the
4 incoming call to the voicemail system.

30. The method of claim 22 wherein the message has a notification to
2 the caller that the caller should call back, and further comprising disconnecting
the incoming call after placing the incoming call on hold.

1/2



100

FIG. 1
SUBSTITUTE SHEET (RULE 26)

2/2

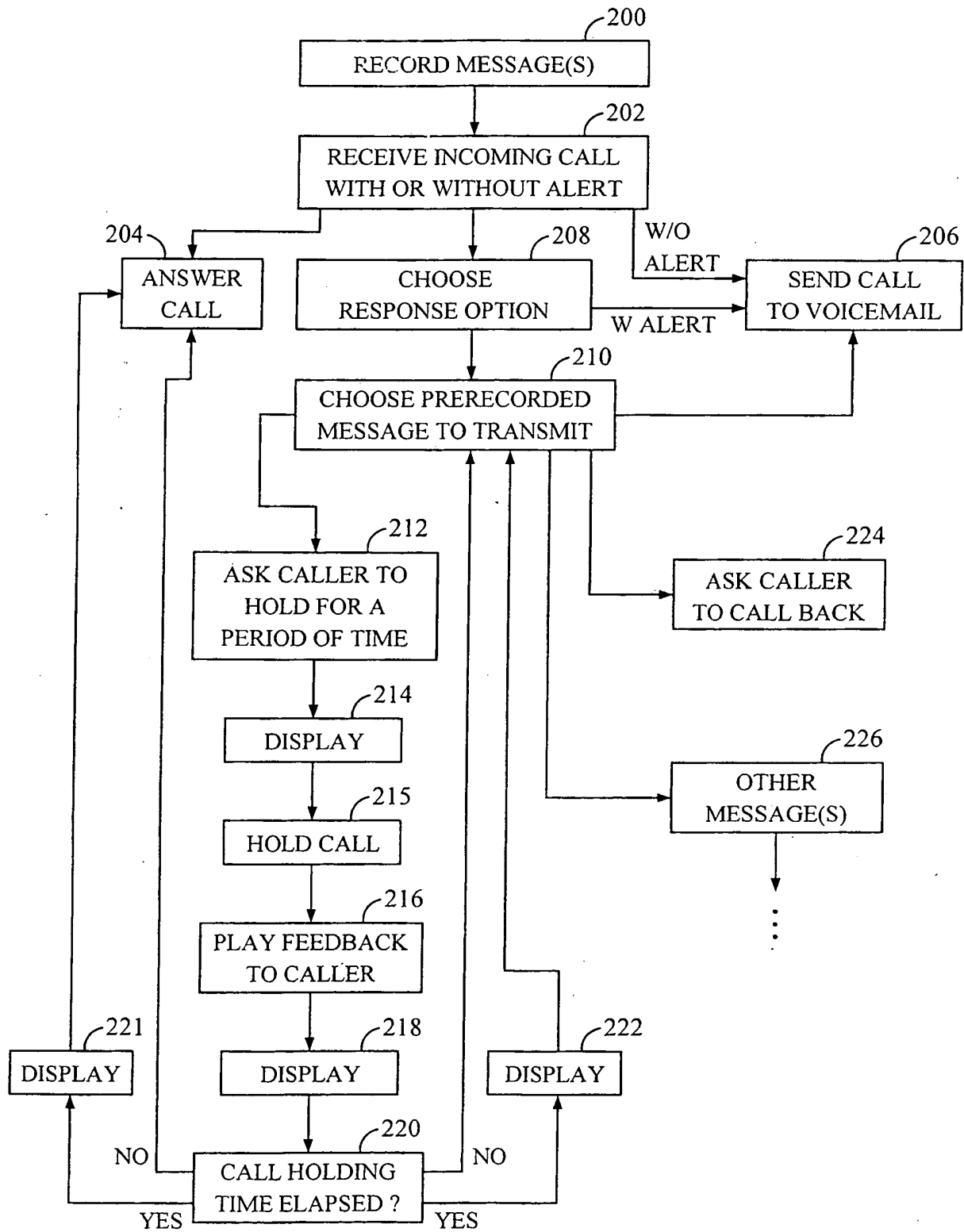


FIG. 2

INTERNATIONAL SEARCH REPORT

Intern. Application No

PCT/US 00/34217

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04M1/725

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	US 6 018 671 A (BREMER) 25 January 2000 (2000-01-25) abstract column 1, line 56 -column 2, line 50 column 3, line 40 -column 5, line 23 claims 1,4 figures 1-4 ---	1-29
X	GB 2 337 666 A (MATSUSHITA COMMUNICATION IND U) 24 November 1999 (1999-11-24) abstract	1,6-12, 15-17, 19-25,30
A	page 1, line 21 -page 3, line 7 page 3, line 16 -page 6, line 4 page 6, line 22 - line 29 figures 1,2 --- -/--	4,5

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *G* document member of the same patent family

Date of the actual completion of the international search

3 April 2001

Date of mailing of the international search report

10/04/2001

Name and mailing address of the ISA
European Patent Office, P.B. 5618 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Fragua, M

INTERNATIONAL SEARCH REPORT

Internat Application No

PCT/US 00/34217

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 851 647 A (HITACHI LTD) 1 July 1998 (1998-07-01) abstract column 2, line 27 -column 3, line 7 column 6, line 12 - line 51 column 7, line 3 -column 8, line 55 figures 1,2,3A,3B ---	1,6,7, 9-12, 15-17, 20-23, 25,30
A	abstract column 2, line 27 -column 3, line 7 column 6, line 12 - line 51 column 7, line 3 -column 8, line 55 figures 1,2,3A,3B ---	4,5
X	US 5 657 372 A (AHLBERG ET AL) 12 August 1997 (1997-08-12) abstract column 3, line 34 -column 4, line 37 column 6, line 22 -column 7, line 22 column 7, line 64 -column 9, line 48 column 11, line 35 -column 12, line 32 figures 2-4 ---	11,15, 16,20, 22,23,25
A	abstract column 3, line 34 -column 4, line 37 column 6, line 22 -column 7, line 22 column 7, line 64 -column 9, line 48 column 11, line 35 -column 12, line 32 figures 2-4 ---	1,6-9,19
X	DE 196 36 282 A (SIEMENS AG) 12 March 1998 (1998-03-12) abstract column 1, line 40 - line 64 column 2, line 21 - line 44 ---	11,15, 16,20, 22,23,25
A	abstract column 1, line 40 - line 64 column 2, line 21 - line 44 ---	1,6,7,9
A	US 5 581 604 A (GRECO ET AL) 3 December 1996 (1996-12-03) abstract column 2, line 29 - line 56 column 4, line 7 - line 26 column 4, line 58 -column 5, line 55 column 6, line 7 - line 27 figures 1,3-5 -----	1,2,4-8, 11-13, 15-17, 19, 22-25, 27-29

INTERNATIONAL SEARCH REPORT

Information on patent family members

Internal Application No

PCT/US 00/34217

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6018671	A	25-01-2000	NONE	
GB 2337666	A	24-11-1999	AU 3944299 A WO 9960765 A	06-12-1999 25-11-1999
EP 0851647	A	01-07-1998	CN 1198069 A JP 10243086 A SG 70057 A TW 391092 B	04-11-1998 11-09-1998 25-01-2000 21-05-2000
US 5657372	A	12-08-1997	AU 693611 B AU 3950995 A BR 9509359 A CA 2202861 A CN 1169233 A DE 69504096 D DE 69504096 T DK 787414 T EP 0787414 A ES 2121428 T FI 971602 A JP 10507601 T NO 971725 A PL 319751 A RU 2140723 C WO 9612378 A	02-07-1998 06-05-1996 04-11-1997 25-04-1996 31-12-1997 17-09-1998 21-01-1999 10-05-1999 06-08-1997 16-11-1998 17-06-1997 21-07-1998 16-06-1997 18-08-1997 27-10-1999 25-04-1996
DE 19636282	A	12-03-1998	AU 4375097 A WO 9810572 A	26-03-1998 12-03-1998
US 5581604	A	03-12-1996	US 5434906 A US 5568540 A US 5625676 A	18-07-1995 22-10-1996 29-04-1997